

**Cover as a Factor in Habitat Selection by Juvenile Brown (*Penaeus aztecus*) and White (*P. setiferus*) Shrimp<sup>1</sup>**

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The factors of primary importance in the distribution of juvenile brown (*Penaeus aztecus*) and white (*P. setiferus*) shrimp within estuarine areas are food availability, substrate, and vegetative cover. Williams (1958) found that they preferred soft mud among five substrates tested in the laboratory. Williams (1955) also indicated, on the basis of trawl data, that juvenile brown and white shrimp prefer a habitat that provides cover (marine grass, algae, etc.). The purpose of this study was to observe the distribution of single-species populations of juvenile brown and white shrimp and a mixed population of the two species in aquaria having vegetated and nonvegetated areas.

Two 25-gallon aquaria were provided with a shell and sand substrate. Cordgrass, *Spartina alterniflora*, was planted in an upright position over half of each aquarium (on the right side of one and on the left side of the other). Shrimp were placed in the aquaria and food pellets distributed randomly at least 24 hours prior to each experiment. Total length (tip of rostrum to tip of telson) of the shrimp ranged from 51 to 70 mm.

Day and night experiments were performed for single species populations of brown and white shrimp. Six shrimp of a species were placed in each of two aquaria for the day experiment, and the number in the grass and in the bare area were recorded on 2 consecutive days at 30-min intervals from 0830 to 1600 (64 observations for each species). In the night experiment, six shrimp of a species were placed in each of two aquaria and observed for one night at 15-min intervals from 0400 to 0745 (32 observations for each species).

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<sup>1</sup> Contribution No. 340, National Marine Fisheries Service Biological Laboratory, Galveston, Texas 77550.

TABLE 1.—*Distribution of brown and white shrimp in aquaria in relation to vegetated and nonvegetated areas*

Type of experiment	Number of observations	In Grass Habitat			Chi-Square
		Mean number	Standard deviation	Percent	
Tested Alone					
White Shrimp					
Day	64	4.81	0.69	80.1	137.8***
Night	32	3.65	0.76	60.8	5.3*
Brown Shrimp					
Day	64	5.19	0.87	86.4	204.2***
Night	32	4.47	0.67	74.5	46.0***
Tested Together					
White Shrimp					
Day	64	2.48	0.76	41.3	11.3**
Night	32	1.63	0.79	27.0	40.3***
Brown Shrimp					
Day	64	5.26	0.70	87.7	219.0***
Night	32	4.25	0.76	70.9	33.3***

\* Significant at .05 level.  
 \*\* Significant at .01 level.  
 \*\*\* Significant at .001 level.

The aquaria were covered on three sides and on the top with black plastic during the night experiments and a 40-watt blue light was briefly turned on every 15 min so that shrimp distribution could be checked.

The distribution of these two species when mixed was determined by the same experimental design. Brown and white shrimp were marked with different colored loops of thread tied just forward of the telson to facilitate species identification in subdued light. The mark caused no mortality and did not appear to affect the behavior of the shrimp. Six brown and six white shrimp were placed in each of two aquaria (12 shrimp per aquarium) and day and night observations of their distribution were made.

A chi-square test was applied to the data with the hypothesis that the shrimp distribute randomly (a mean of three shrimp of each species in the grass), and significant deviations from a random distribution were noted. When treated separately, brown and white shrimp showed a significant preference for the grass both day and night (Table 1). This preference may serve in nature as a defense against predation and may also be related to food availability in vegetated areas.

When the species were mixed, the brown shrimp concentrated in the grass, whereas the white shrimp were more numerous in the bare area. If the displacement of white shrimp by brown shrimp also occurs in nature, it may

have a significant effect on the survival of white shrimp.

#### LITERATURE CITED

- WILLIAMS, A. B. 1955. Contribution to the life history of commercial shrimps (Penaeidae) in North Carolina. *Bull. Mar. Sci. Gulf Caribb.* 5(2): 116-146.  
 ———. 1958. Substrates as a Factor in Shrimp Distribution. *Limnol. Oceanogr.* 3(3): 283-290.